ON TWO NEW TRILOBITES FROM BOWNING.

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(Plates xv.-xvi.)

Dalmanites (Hausmannia) loomesi, n.sp.

(Pl. xv., figs. 1, 2; Pl. xvi., figs. 3, 4, 5).

Hausmannia meridianus, Eth. and Mitchell (in part), Proc. Linn. Soc. N. S. Wales, 1895, pp.504-509.

Complete form oval.

Cephalon subsemicircular, smooth, moderately convex, greatest length, 25mm., width, 58 mm. between the genal angles.

Glabella subpyriform, very gently tumid, depressed; anterior glabellar furrows wide, shallow, oblique and do not meet medially; second pair slit-like, do not communicate with the axial grooves, nor are they continuous transversely; third pair similar to second pair, but nearly reach the axial furrows; front glabellar lobe subellipsoidal, anterior pair subtriangular, second and third pairs more or less rectangular, the latter pair being rounded at the postero-lateral angles by the neck furrow; neck furrow deep and narrow towards the axial grooves, but faint medially, and has an anterior direction centrally and basally; its lateral extensions are wide and fairly deep, especially along their anterior boundary, thus giving to the portions of the fixed cheeks abutting them prominent faces; neck ring moderately arched, its lateral extensions narrow and prominent. Axial grooves wide and shallow. Fixed cheeks large, the portions between the posterior branches of the facial sutures and posterior furrows delicately wrinkled; genal lobe large, mildly convex, subpyriform, and separated from the palpebral lobes by a shallow furrow; genal angles bear spines reaching to the sixth and seventh thoracic somite. Free cheeks small, continuous, depressed, lateral furrows narrow and deep, borders

very gently convex and diminish in width as they pass around the front of the glabella. Facial sutures follow the courses characteristic of the genus.

Thorax: greatest width, 57 mm., length, 30 mm., smooth or microscopically granular, mildly inflated; axis subspindle-shaped, the fifth and sixth rings being the widest, and from these the width gradually diminishes posteriorly, mildly convex, greatest width 12 mm., or about half as wide as the width of one side lobe, bases of rings very slightly swollen. Side lobes very mildly convex, medial furrows of somites wide and deep, the ridges of these, too, are strong, the posterior ones being thickened at the ends abutting the axial grooves, so as to appear mildly tuberculate; their terminals are claw-like.

Pygidium: triangular and smooth axis consists of 16 to 20 rings (dependent on the state of maturity), of which the last two or three are faintly outlined; only mildly convex, its width diminishes gradually posteriorly and terminates with less than one-third of the anterior spread inconspicuously, at the border; the six or more anterior rings have their bases gently thickened, those posterior to these very gradually become fainter, and towards the end annulations frequently seem to obsolesce; its greatest spread is approximately half as great as one side lobe. Side lobes mildly inflated, gradually sloping from near the axial grooves to the periphery; the pairs of segments number from eleven to fourteen according to the state of maturity reached by the individuals examined, and are very similar in structure to the thoracic somites, their ridges, furrows and articulating sutures crossing the border to the narrow, very gently thickened edge; each preceding pair has an increasing backward bend, so that the last pair is parallel with the axis line. Border wide, similar in convexity with the pleura; inwardly its boundary is indicated by a succession of fine linear ridges in the furrow of each pleuron; the under surface is finely and beautifully punctate; behind the axis it is continued into a short deltoid spine, that is not in any way connected with the pygidial axis, for at the inner boundary of the border the axis vanishes.

Obs.—When describing *Hausmannia meridianus* (These Proceedings, x., 1895, Pl. xxxviii., figs. 1-3, etc.) Mr. Etheridge, Junr., and myself joined with it the present form, under the impression that the differences in their pygidial mucros, etc., were insufficient reason for their separation, and were perhaps merely sexual variations. That this latter part of our conclusion is erroneous still remains to be shown, but the acquirement of much additional material of both varieties has proven that the differences between them are greater than was at first recognised by us; and that in one fairly important assumption made by us, we were in error, viz., that when the pygidial border was removed and bore the spine with it, the spinal or mucronal impression left was identical in both varieties. Further, a careful revision of a very large number of specimens of the two varieties now in my collection, goes to show that they differ from each other in so many respects, that their specific separation is, from my point of view, justified on scientific grounds. The differences between these two Australian forms seem to be quite as numerous and important, as are those between *Dalmanites caudatus* and *D. longicaudatus*, and, therefore, the two local forms present equally strong claims for separate specific distinction. The following is a tabulation of the differences between specimens represented on Plate xv., figs. 1 and 3:—

Tabulation of differences between *D. meridianus* and *D. loomesi* in the case of an almost perfect specimen of each, that of *D. meridianus* being the nearer to maturity. The measurements are in millimetres in every case.

Parts of the fossils contrasted.	Character of the parts in *D. meridianus*.	Character of the parts in *D. loomesi*.
i. Complete form—		
(*a*) Outline ... ... Length and width	Elongate oval.	Broadly oval.
(*b*) Length from front margin to outer edge of tail border	93 mm.	83 mm.
(*c*) Greatest width ... (at the genal angles)	53 mm.	57 mm.

Parts of the fossils contrasted.	Character of the parts in *D. meridianus.*	Character of the parts in *D. loomesi.*
ii. Cephalon—		
(*a*) Length	26·5 mm.	25 mm.
(*b*) Width	53 mm.	57 mm.
(*c*) Glabella	No marked	difference.
(*d*) Fixed cheeks ...	Slightly smaller.	Slightly larger.
(*e*) Genal lobes... ...	Slightly smaller.	Slightly larger.
(*f*) Extreme width between eyes ...	30 mm.	39 mm.
(*g*) Length of eye ...	10 mm.	11 mm.
iii. Thorax—		
(*a*) Length	37 mm.	31 mm.
(*b*) Width	50 mm.	58 mm,
(*c*) Axis	Fairly prominent.	Less prominent.
(*d*) Bases of axial rings ...	Strongly tuberculate	Very mildly tuberculate
(*e*) Proportionate width of axis to one side of lobe	14 : 20.	14 : 25
iv. Pygidium—		
(*a*) Length exclusive of mucro	30 mm.	28 mm.
(*b*) Width (greatest) ...	40 mm.	47 mm.
(*c*) Axial rings... ...	17.	16
(*d*) Axis	Terminally prominent.	Terminally not prominent.
(*e*) Pleural segments (pairs of)	10 to 12.	13
(*f*) Mucro	Continuous with the axis.	Not continuous with axis
(*g*) Impression of spine left after removal of the border ...	Long and acicular.	Short, triangular.

It appears that the generic term *Hausmannia,* proposed by Mr. Etheridge, Junr., and Mitchell (These Proceedings, 2nd Ser., x., 1895, p. 502) to take the place of *Dalmanites* Barr., and which had been previously suggested for a subgenus of *Dalmanites* by Hall and Clarke (Palæont. New York, Vol. lxxxi.), has been rejected by palæontologists; and for this rejection I am willing to admit there is very good reason, if there were no other than that *Dalmanites* has been so long in use and generally accepted; acting in compliance with this view the fossil above described is placed in the *Dalmanites* group, although it in some minor features differs from the genotype *D. caudatus* Brunn. For

instance, in the present form there is a partial fusion of the first, second and third pairs of glabellar lobes by the partial or complete obsolescence of the second and third pairs of glabellar furrows as they approach the axial grooves; but this obsolescence has not sufficiently progressed to affect the pentamerous character of the glabella. It further differs from the genotype by the interruption, centrally, of the first pair of glabellar furrows, which, therefore, do not detach the frontal lobe from the rest of the glabella, as occurs in the case of *D. caudatus*. In these two modifications it shows the first steps of the specialisation developed so fully in the true *Phacops* group, but it is remarkable that, in the Australian Palæozoic seas, as far as research has yet revealed, a group represented by the species now under discussion, and by *D.* (*Hausmannia*) *meridianus* E. and M., exhibiting only a small degree of specialisation, should make its sudden appearance, associated with such highly specialised forms as *Phacops crossleii* E. & M., and *P. latigenalis* E. & M., and by the very highly specialised form described further on, unaccompanied by intermediate forms.

Besides the specialisation of the glabellæ noted above, the pygidia of our members of the *Dalmanites* branch, show transition towards the pygidial segmentation of the Devonian species of the branch, but do not exceed the segmentation allowed to be the limit for Silurian species by F. R. Cowper Reed (Geol. Mag., N.S., Dec. v., Vol. ii., 1905, pp.172-178 and 224-228), viz., 12-16. In the present species the pleural segments of the pygidium in individuals nearing maturity range from twelve to fourteen, and in *D.* (*Hausmannia*) *meridianus* ten to twelve. The largest pygidium of the species now described possesses twenty axial rings and fourteen pairs of pleural segments. In *D. meridianus* these similar divisions are seventeen and twelve respectively for the largest known specimens. Mr. Reed (*loc. cit.*) refers to the absence of the Silurian forms of *Dalmanites* from Bohemia, and particularly from the typical Silurian horizon, Barrande's étage E. It is somewhat interesting to note that the lower Trilobite Beds of our Bowning Series, judging by the trilobite fauna they have yielded, are homotaxial with the beds forming Barrande's étage E.

and that from these Bowning Beds the Silurian *Dalmanites* group of trilobites is absent, just as it is from étage E of the Bohemian rocks. Recent study of the Bowning Series reveals a great break in the sedimentary continuity between the Lower and Middle Trilobite Beds of the Bowning Series, which when properly investigated, may greatly affect our conclusion respecting the age of the Middle Trilobite and succeeding Beds. Until the Family *Phacopidae* was dealt with by Etheridge, Junr., and Mitchell, the trilobite now under review was generally considered to be *Dalmanites caudatus,* but when the forms are contrasted it is seen they differ very much from each other. As far as I have been able to ascertain, *D. perce-ensis* Clarke (New York State Mus., Bull. 107, 1907, pp. 157-158) is one of the most closely related to our species; but it differs from ours in possessing from fifteen to seventeen pleural segments in the pygidium, etc. Dedicated to Mr. F. Loomes, of Bowning, who obtained the fine specimen represented on Plate xv., fig. 1.

Loc. and hor.: Near Bowning Railway Station, Parish of Bowning, County Harden; Yass-Burrowa Road, Lime Stone Creek, Parish of Derrengullen, County King, etc. Upper and Middle Trilobite Beds, Bowning and Yass Series, Upper Silurian, and perhaps in the upper zone of its occurrence, Lower Devonian.

On examining my trilobite specimens recently I came across one so different to any other known to me that I have thought it necessary to make of it the type of a new genus.

Order **PROPARIA.**

Family PHACOPIDÆ.

Subfamily PHACOPINÆ (Reed).

Genus ADASTOCEPHALUM,* g.n.

Gen. chars.—Glabella subquadrate, mildly rounded in front, sides straight, only gently converging to the neck ring; lateral glabellar furrows and lobes absent.

The outstanding features of this new type are the complete

* ἀδαστος, undivided.

absence of glabellar furrows and lobes; the small convergence of the axial furrows posteriorly, squat condition of the eyes and mild convexity of the cephalon.

ADASTOCEPHALUM TELEOTYPICUM, g. et sp.n.

(Plate xvi., figs. 1 and 2).

Sp. chars.—*Cephalon* mildly convex, finely granular, and subsemicircular. Glabella only moderately convex, gently rounded in front, sides rather straight. Neck furrow deep, neck ring moderately arched, bases strongly directed forward, and interrupting the continuity of the neck furrow laterally. Limb very narrow. Axial grooves deep, and only converging moderately, posteriorly. Cheeks relatively small, gently convex, genal and palpebral lobes ill-defined; posterior furrows narrow, deep, and with the lateral furrows, which are shallow, form almost a semicircle; posterior ridges narrow, strongly directed anteriorly and merging into the depressed lateral borders in such a way as to obliterate the genal angles. Eyes not prominent, rather squat, and they and the palpebral lobes are indistinctly separated from the genal lobes; in th central rows of eye facets there appear to have been four individuals in each row.

Obs.—The subject of this description is a headshield, of which the left cheek is much damaged, but the rest is fairly perfect, except that the right eye is somewhat distorted. This form is just such as could reasonably have been expected to make its appearance before the close of, say, the lower Devonian period, and apparently marks the limit of specialisation in the glabellæ of the true Phacops group. Perhaps the nearest relatives of the form now under consideration are *Ph. logani* Hall, *Ph. rana* Green, and *Ph. hylanderi* Clark, for in each of these species the first and second pairs of gabellar furrows are obsoleseed. It is also worth noting that our highly specialised type occurs associated with *Ph. crossleii* and *Ph. serratus,* which possessed the normal glabellar furrows, though faintly defined. The limb or front lobe of the glabella in each of these two species is obsolete, but in the new form this limb is present, but indistinctly outlined. For purposes

of comparison and contrast photos of the above two Bowning species will be found on the plates illustrating this paper. Other associates are *Ceratocephala longispinosa* Mitchell, *Odontopleura* (*Acidaspis*) *jenkinsi*, and *O. rattei*, and a coral which is thought to be *Pleurodictyum megastomum* McCoy. The occurrence of the latter fossil, together with many lamellibranchs not yet determined, but which, if not actually Devonian species, are closely allied to them, indicates that it is more than likely that the upper beds of the Bowning stratified rocks will prove to belong to the lower Devonian horizon, although up to the present Mr. Etheridge and myself have considered these beds to be Upper Silurian or passage beds between these two formations.

Loc. and hor.—Near the railway station, Bowning township. Parish of Bowning, County Harden, N.S.W. Upper Trilobite Bed. Probably Lower Devonian.

(*Note.*—In my paper "The Carboniferous Trilobites of Australia" (Proc. Linn. Soc., N.S.Wales, xliii., 1918, pp. 437-494, Pls. 46-53), a few omissions and errors occurred. These I wish to have the privilege to correct.)

Explanation of Plates.

Plate xliii., fig.9.—*Read*—Medial portion of a cephalon much weathered (Coll. Queensland Mus., No.707).

Plate xlix , figs. 1, 2, 3, 4, and 6 are photos of wax impressions of casts; fig. 6 is the counterpart of fig. 5. Figs. 3 and 4 are from Malchi Creek, near Rockhampton, Queensland.

Plate lii., fig.2 represents specimen F1031 and not F1017 of the Queensland Geol. Surv.

Plate liii., fig 9, represents Pl. vii., fig.11, Geol. and Pal. Queensland and New Guinea.

Page 465, last line—*for* figs.5-6, *read* fig.5.

EXPLANATION OF PLATES.

Plate xv.

Dalmanites loomesi Mitchell.

Fig.1.—An almost perfect individual, slightly enlarged

Fig.2.—A fine pygidium showing about 20 rings in the axis and 14 segments in the pleura, and the absence of connection between the axis and tail spine, etc. The pygidium belonged to an individual that had a length approximately of four and a half inches. ($\times \frac{5}{3}$). (Coll. Mitchell).

Hausmannia (Dalmanites) meridianus E. & M.

Fig. 3.—The photo of the original type specimen of *Hausmannia meridianus* E. & M.; contrasting this with fig. 1 of this Plate, the differences between the two species will be very evident. (× ½ nearly).

Fig. 4.—A pygidium showing 12 pleural segments and the extension of the axis into the spine. (× ⅝). (Coll. Mitchell).

Phacops crossleii E. & M.

Fig. 5.—An almost perfect specimen for comparison and contrast with *Adastocephalum teleotypicum*. (× about 2). (Coll. Mitchell).

Phacops serratus E. & M.

Fig. 6.—A very fine specimen of a young individual given to compare and contrast with *Adastocephalum teleotypicum*. (× about 2). (Coll. Mitchell).

Plate xvi.

Adastocephalum teleotypicum Mitchell.

Fig. 1.—Photo of the only portion of the glabella known; shows the generic and specific features fairly well. (× about 2). (Coll. Mitchell).

Fig. 2.—The same with outline restored.

Dalmanites loomesi Mitchell.

Fig. 3.—Photo representing portion of a thorax, and complete pygidium, except for the removal of a part of the border. Shows the imperceptible mergence of the thoracic axis into the pygidial axis, etc. (Coll. Mitchell).

Fig. 4.—Another photo of the same specimen shown on Plate xv., fig. 1, with the defective part restored. (Reduced). (Coll. Mitchell).

Fig. 5.—Side view of an eye; (× about 3). (Coll. Mitchell).

Hausmannia (Dalmanites) meridianus.

Fig. 6.—Photo from a squeeze of the counterpart of a pygidium showing the long acicular spine or telson; (× 2). (Coll. Mitchell).

Fig. 7.—Pygidium of a mature individual showing twelve pleural segments and their characters clearly.